An Overview of Technology Resources, R&D and Strategic Directions in the ERDC - Environmental Laboratory

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US Army Corps of Engineers®

Engineer Research and Development Center

Environmental Laboratory

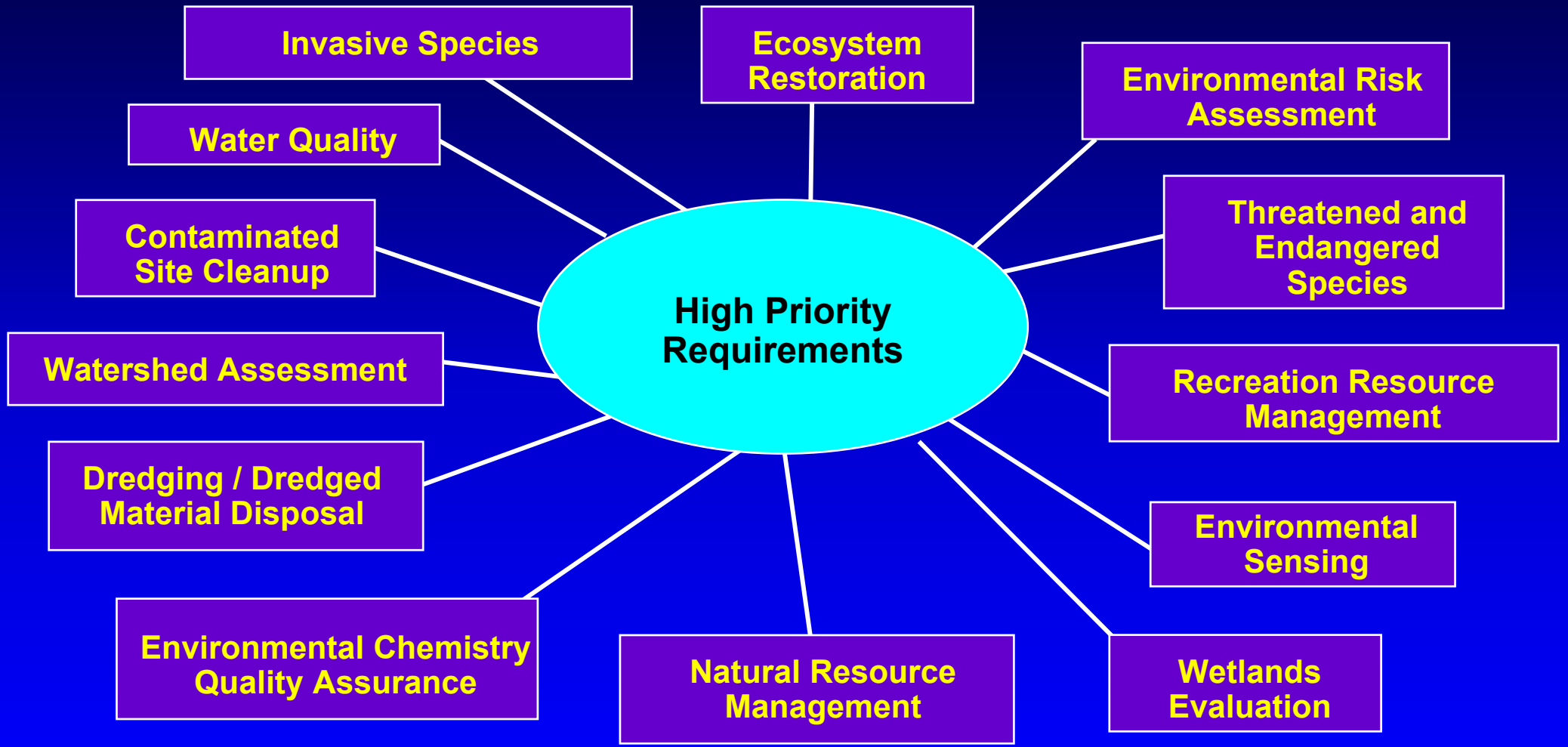
Mission

- Provide state of the art environmental research and development capability to directly support the US Army Corps of Engineers', the Army's, and the Nation's civil and military missions

Research Emphasis

- Model and predict the effects of human activities on the environment
- Develop methods to mitigate unacceptable environmental impacts
- Provide technology for environmental restoration and enhancement

Environmental Laboratory Research Areas



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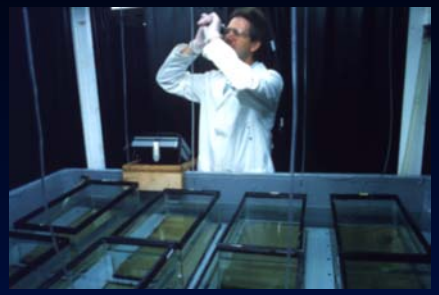
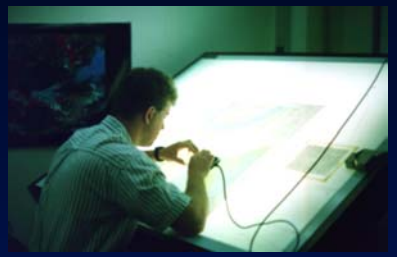
Key R&D Facilities at WES



- **Fate and Effects R&D Center 25,000 ft²**
  - Laboratories and greenhouses
  - Rainfall simulators/soil lysimeters
  - Environmental chambers
  - Static and continuous flow bioassays



- **Geospatial Data Analysis Facility 2,000 ft²**
  - GIS / Remote Sensing / GPS technology applications
  - Landscape modeling
  - Unique spatial applications

- **Hazardous Waste Research Center 10,000 ft²**
  - Supports military and civilian cleanup
  - RCRA permitted
  - EPA recognized as premier facility

- **Aquatic and Wetlands R&D Center 14,000 ft²**
  - Laboratories and greenhouses
  - Flumes
  - Environmental chambers
  - 1,000 ft² molecular biology lab

- **Environmental Chemistry Laboratories - 22,000 ft²**
  - Specialized analytical chemistry support
  - Quality assurance program development
  - Premier environmental chemistry lab in DoD

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Remote Research Facilities

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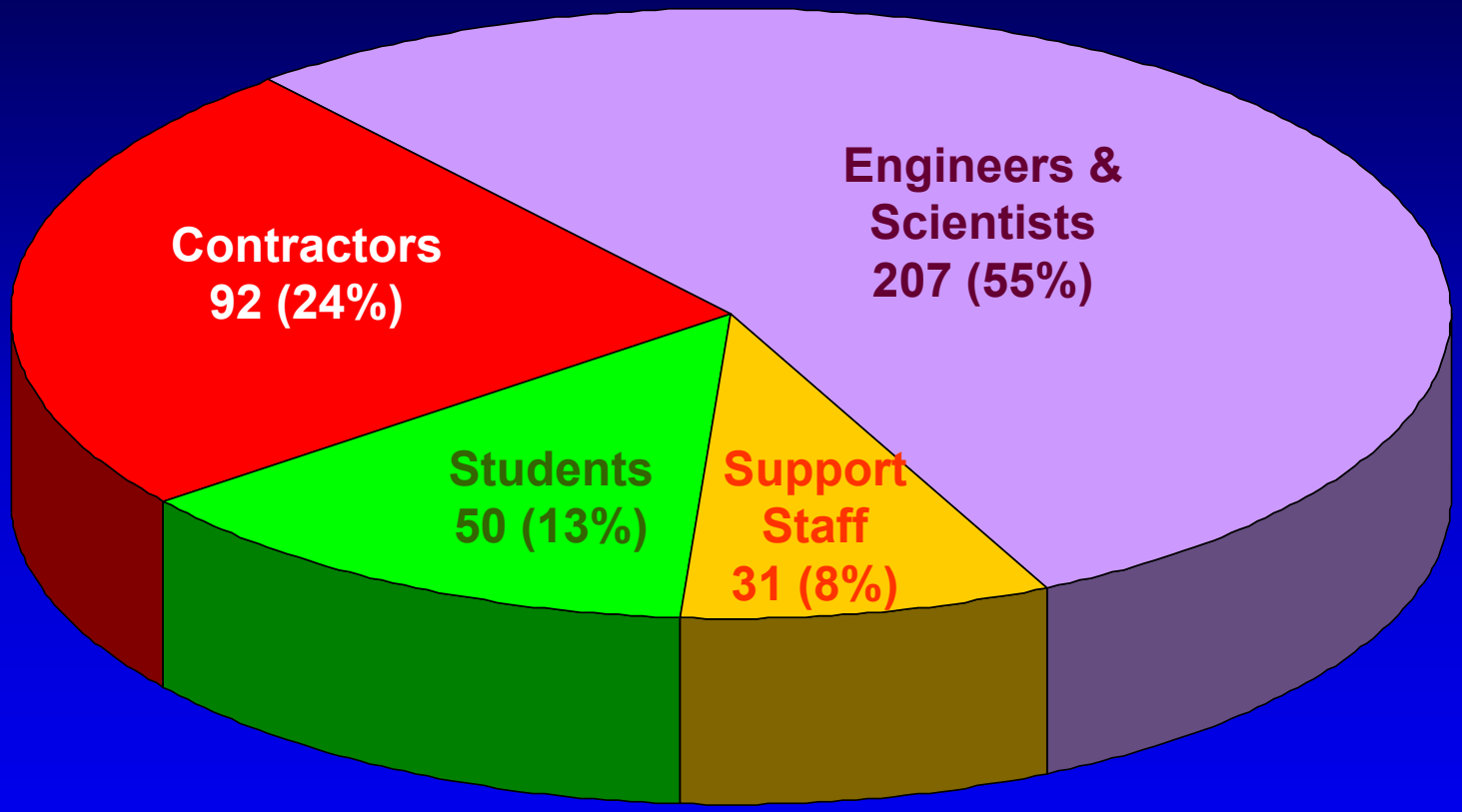
380 Employees



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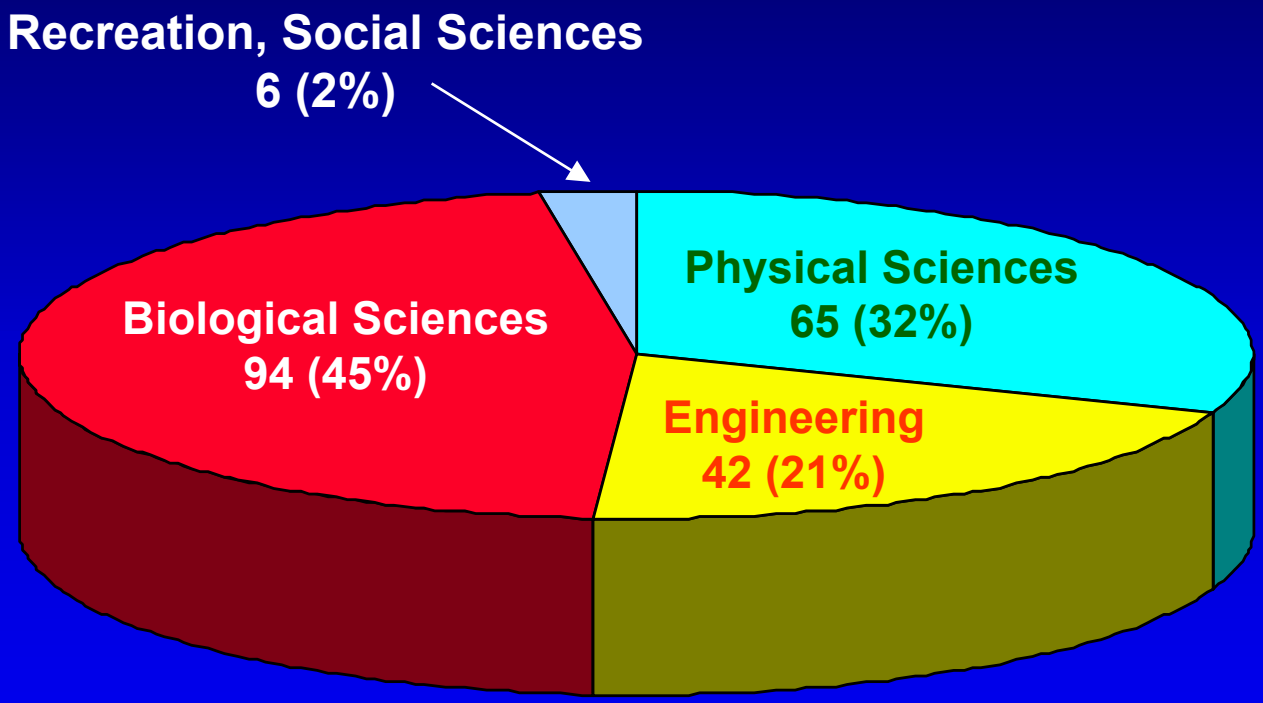
Environmental Laboratory Disciplines



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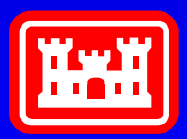
Environmental R&D Programs (CW) by Funding Authorities

- **General Investigations**
  - Water Quality ⟶ System-wide Modeling, Assessment and Restoration Techniques (03)
  - Ecosystem Management & Restoration
  - Long Term Effects of Dredging Operations
- **Operations & Maintenance**
  - Zebra Mussel ⟶ Nuisance Aquatic Species Control (02)
- **Construction General**
  - Aquatic Plant Control

FY03 Budget ca. 65M
- **45% Direct**
- **55% Reimbursable**

Tactical vs. Strategic R&D

- **Tactical**
  - Present Needs
  - Project Scale
  - Customers = 1+
  - Disciplines = 1+
- **Strategic**
  - Future Needs
  - System Scale
  - Multiple Customers
  - Interdisciplinary



Strategic R&D Programs with Strong Environmental Emphasis

Goals:

- Address National priorities
- Increase strategic emphasis
- Increase interagency collaboration
- Increase stakeholder involvement

Funded FY03 Programs

- Regional Sediment Management – CHL lead
- System-wide Modeling, Assessment, and Restoration (SMART) – EL lead

SMART Program/EL Lead

- Broad Problems
  - Watershed Activities *IMPACT* CE Projects
  - Watershed to River to Estuary/Coastal Response
  - Ecosystem Management and Restoration Requires Improved *ASSESSMENT APPROACHES*

IMPACTS

- Cumulative
- Difficult to Predict
- Difficult to Quantify
- System-wide

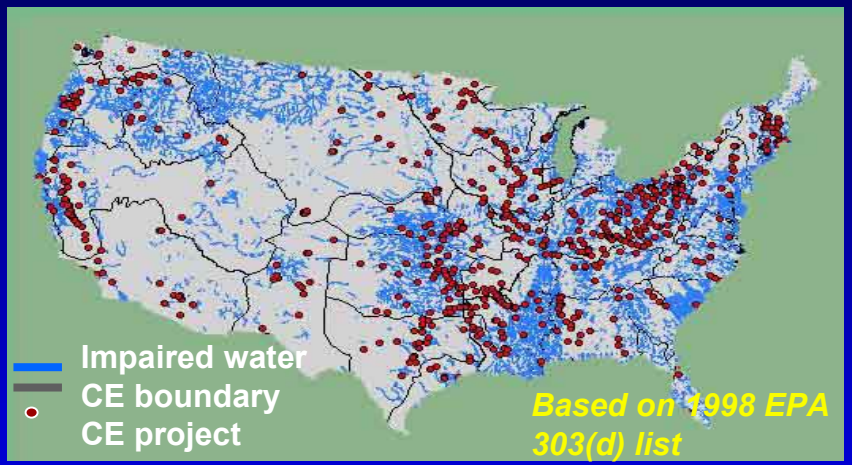
ASSESSMENT APPROACHES

- Improved Tools & Capabilities
- Effective Applications
- Attention to Future Conditions (Sustainability)

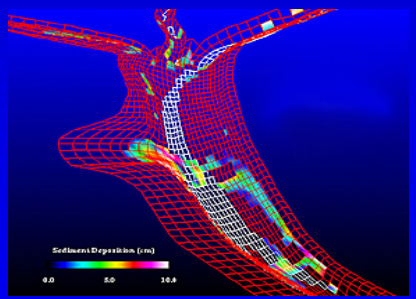
SMART Program 1° Deliverable

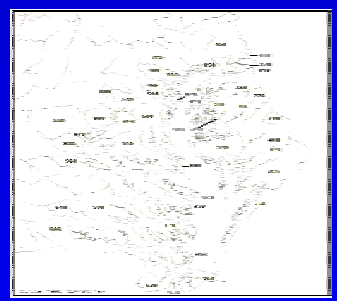
System-Wide Approach for Comprehensive Resource Management

Sustainability



Environmental Operating Principles





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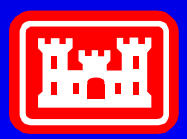
Sustainability

A synergistic process whereby environmental, economic, and societal considerations are effectively balanced in Project Planning, Design, Construction and Operation and Maintenance in meeting the needs of the present without compromising the quality of life for future generations (CE).



Impossible to Achieve Environmental Sustainability?

- It's not 1854
- People part of the landscape

- Society has spoken - Nation wants both economic and environmental benefits

Conundrum

How to manage for sustainability when:

- There are essentially no (or few) natural references
- Historical data are meager
- Effects of “Water Resources Development” continue

So then:

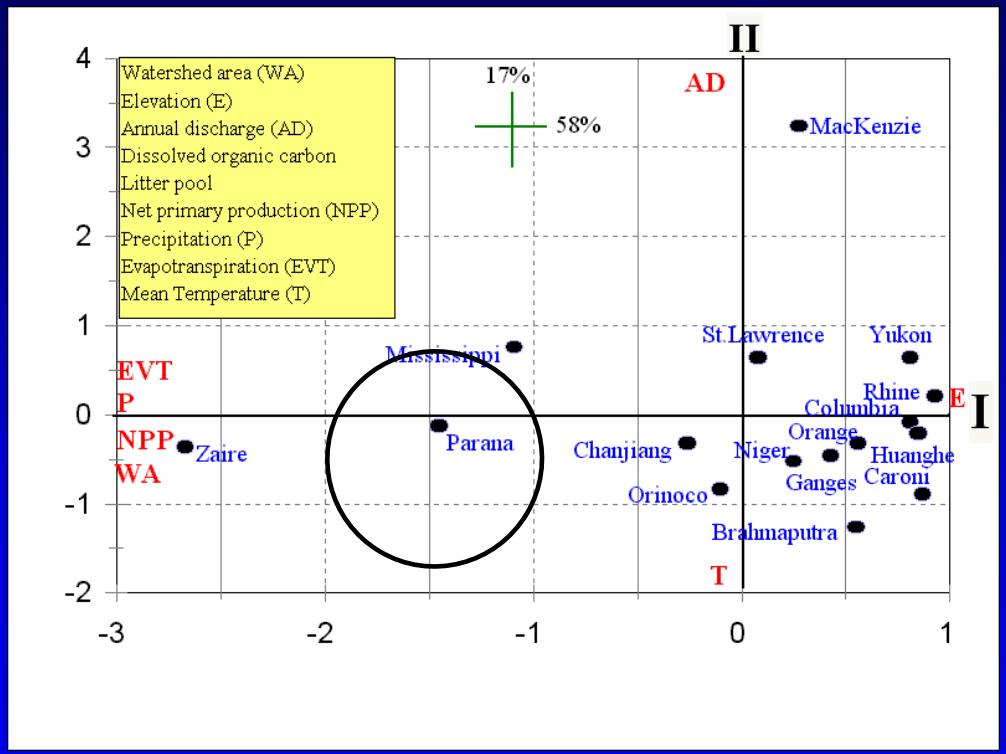
- What framework can be used for management (adaptive)?
- How can management decisions be defended?
- How do we develop performance standards?
- What metrics need to be employed?

Internal/Virtual Reference Conditions

Focus on Processes

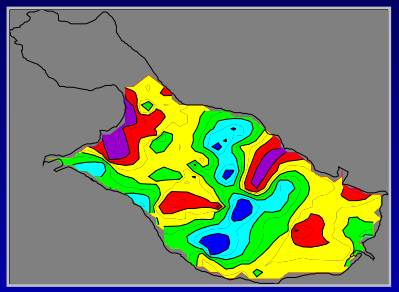
Study Other Systems

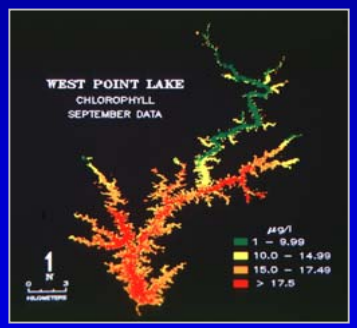
Attention to processes will allow use of info from other systems. Principal Components Analysis (Baigun and Oldani, unpub.) of the worlds great rivers.

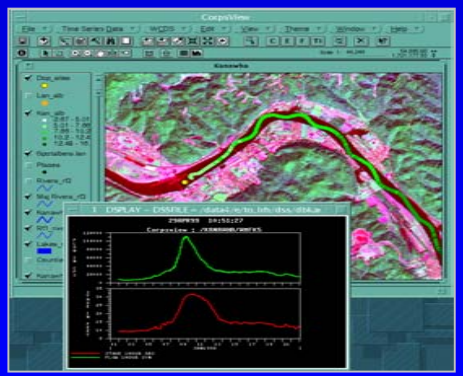


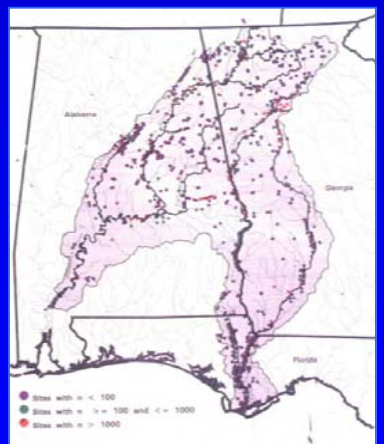
Focus on Processes

National Challenge: Comprehensive Resource Management *(How do we do it, and what are the key environmental problems to be addressed?)*



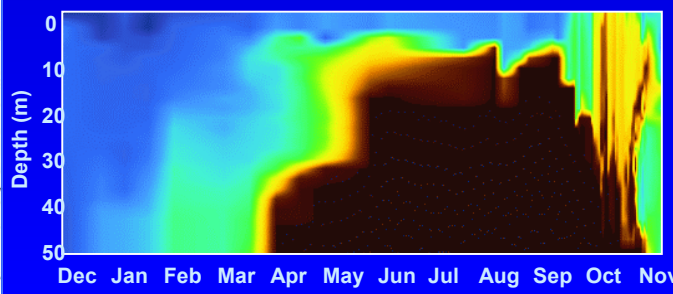






Sediment & Nutrient Loading

Eutrophication	T&E Species
Water Quality	Exotic Species
Land Use/Abuse	Harmful Algal Blooms
Scale Issues	Hypoxia
Water Management	Gas Supersaturation
Habitat	Temperature Control



Strategic Approaches to Resource Management

- Choose extant tools for adaptation and improvement
- Create new management tools from first principles
- Deal with interconnected problem suites – not individual problems

Lastly – We need to collaborate for success